

FIGURE 1  
 POURBAIX DIAGRAM AT 25° C WITH  $1 \times 10^{-6}$  DISSOLVED MANGANESE  
 CONCENTRATION

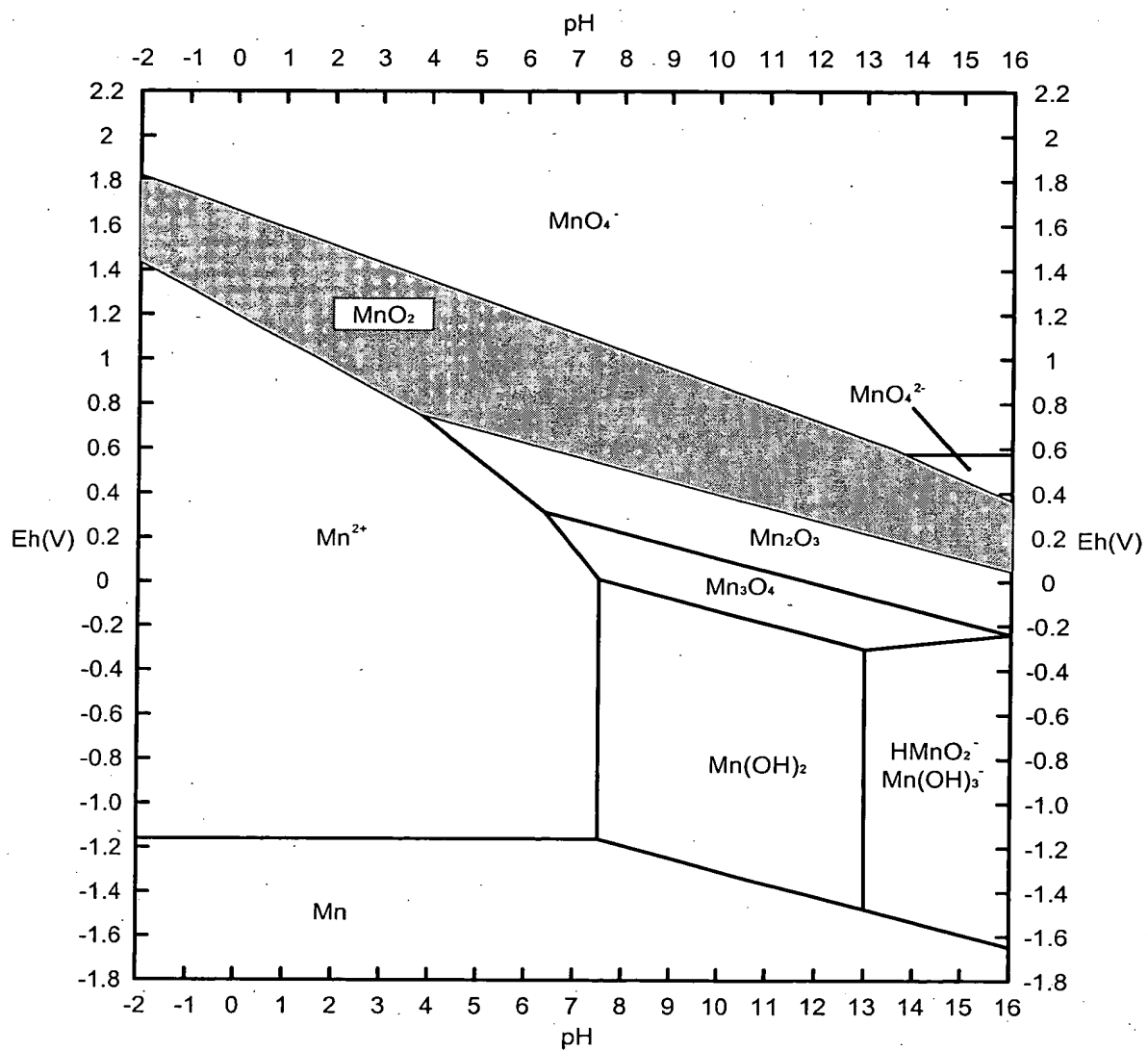


FIGURE 2  
 POURBAIX DIAGRAM AT 25° C WITH  $1 \times 10^{-6}$  DISSOLVED MANGANESE  
 CONCENTRATION

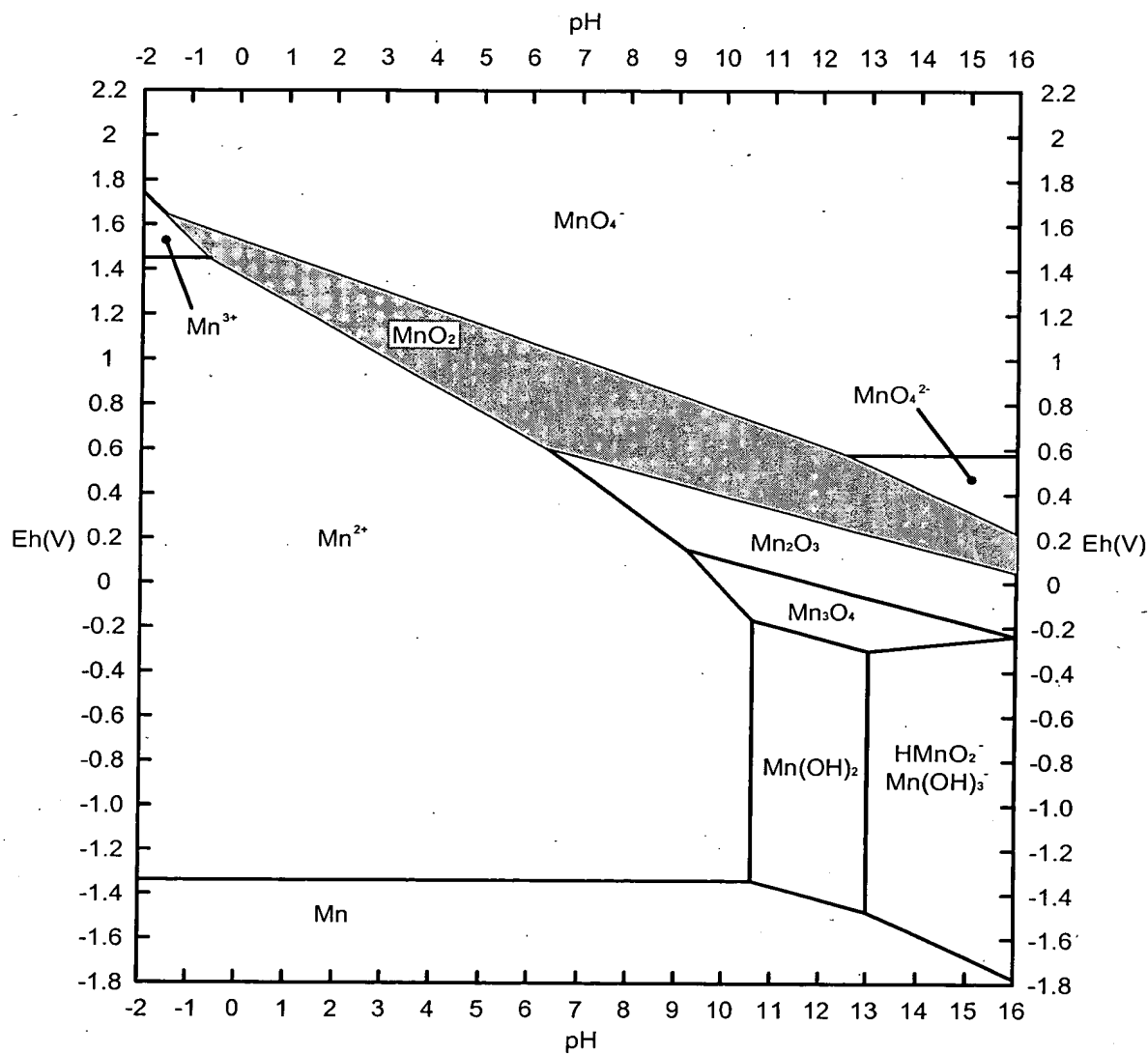


FIGURE 3  
REGENERATION OF LOADED SORBENT

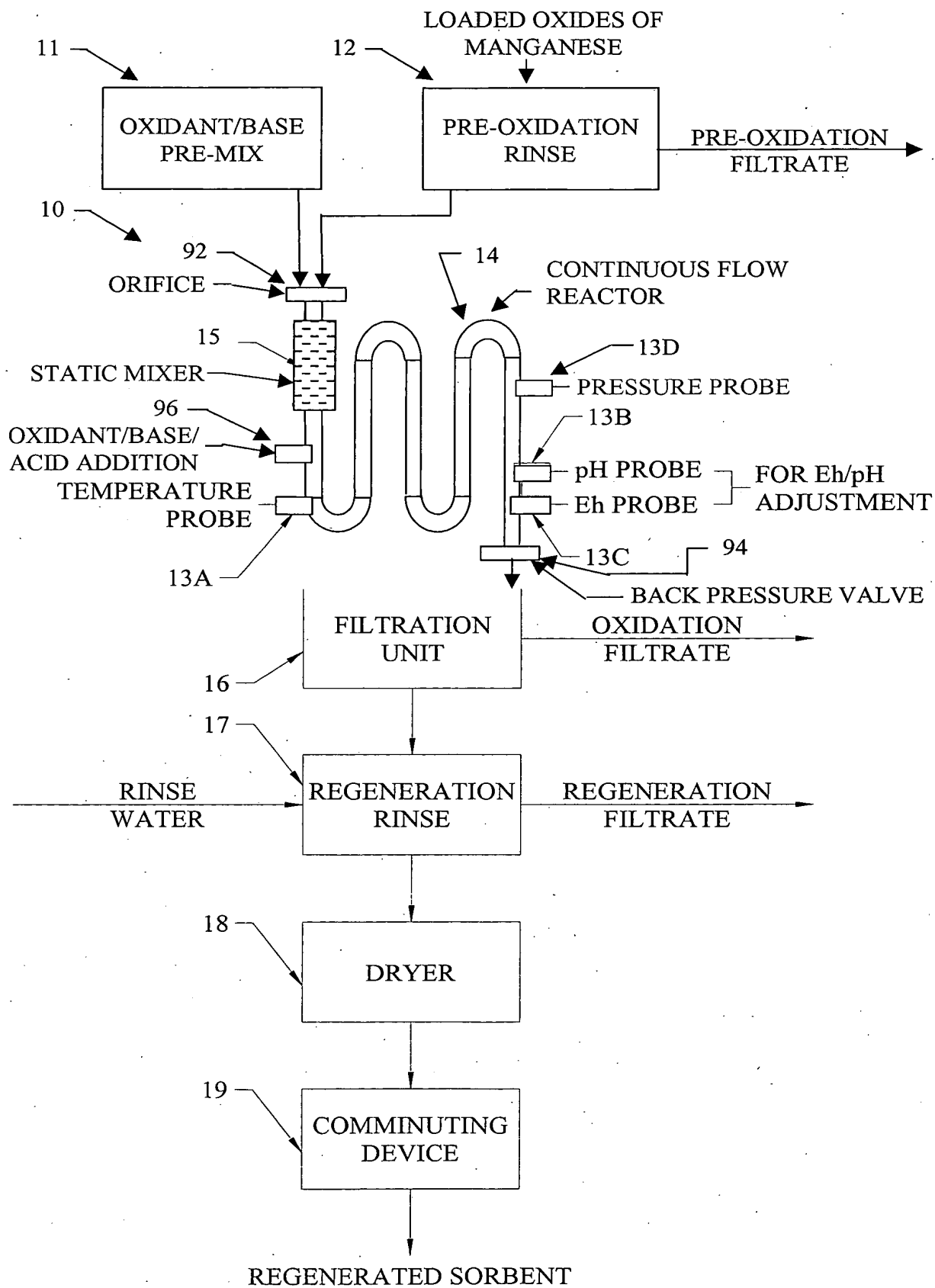


FIGURE 4  
REGENERATION OF LOADED SORBENT

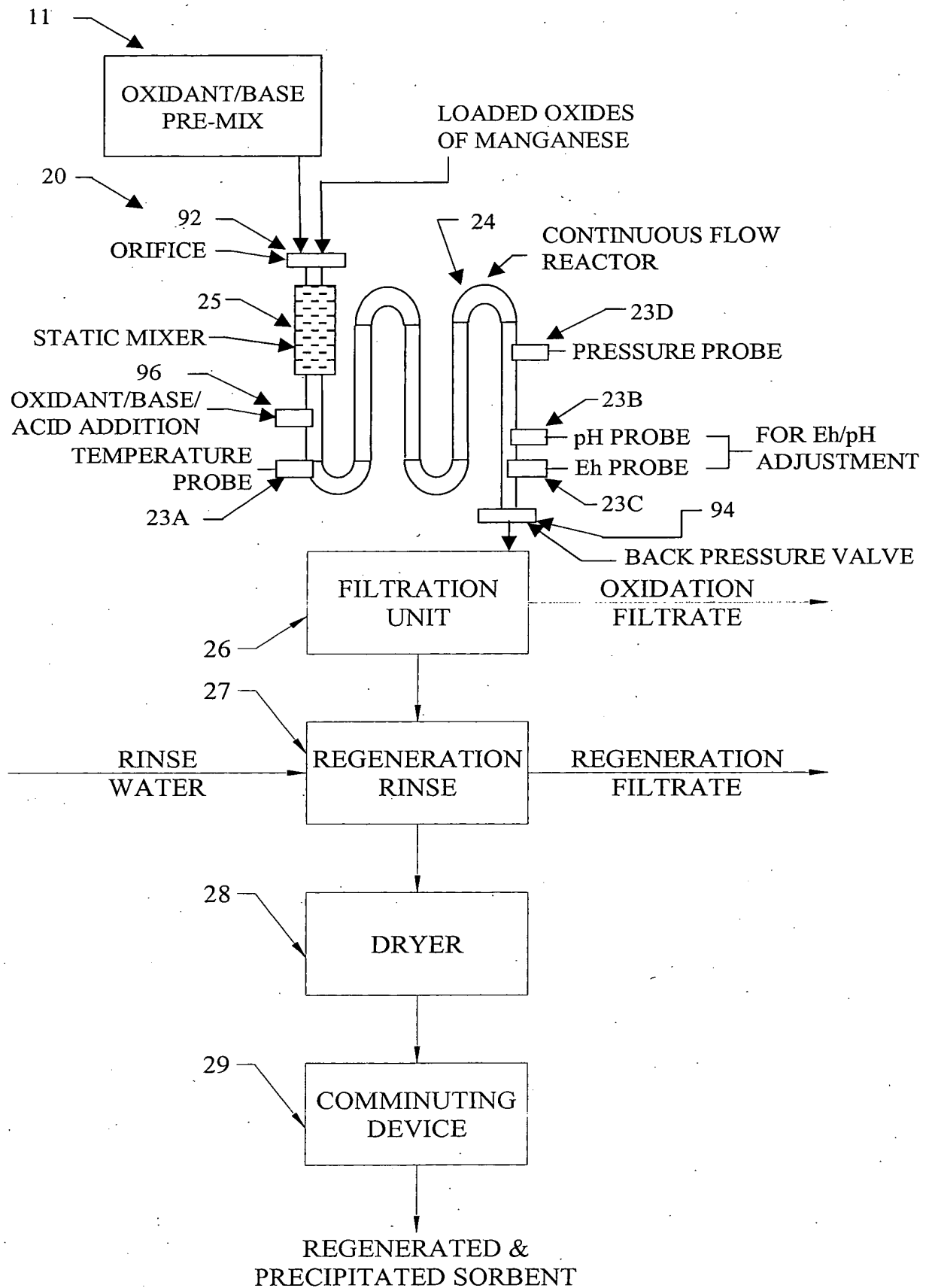


FIGURE 5  
REGENERATION & PRECIPITATION OF SORBENT

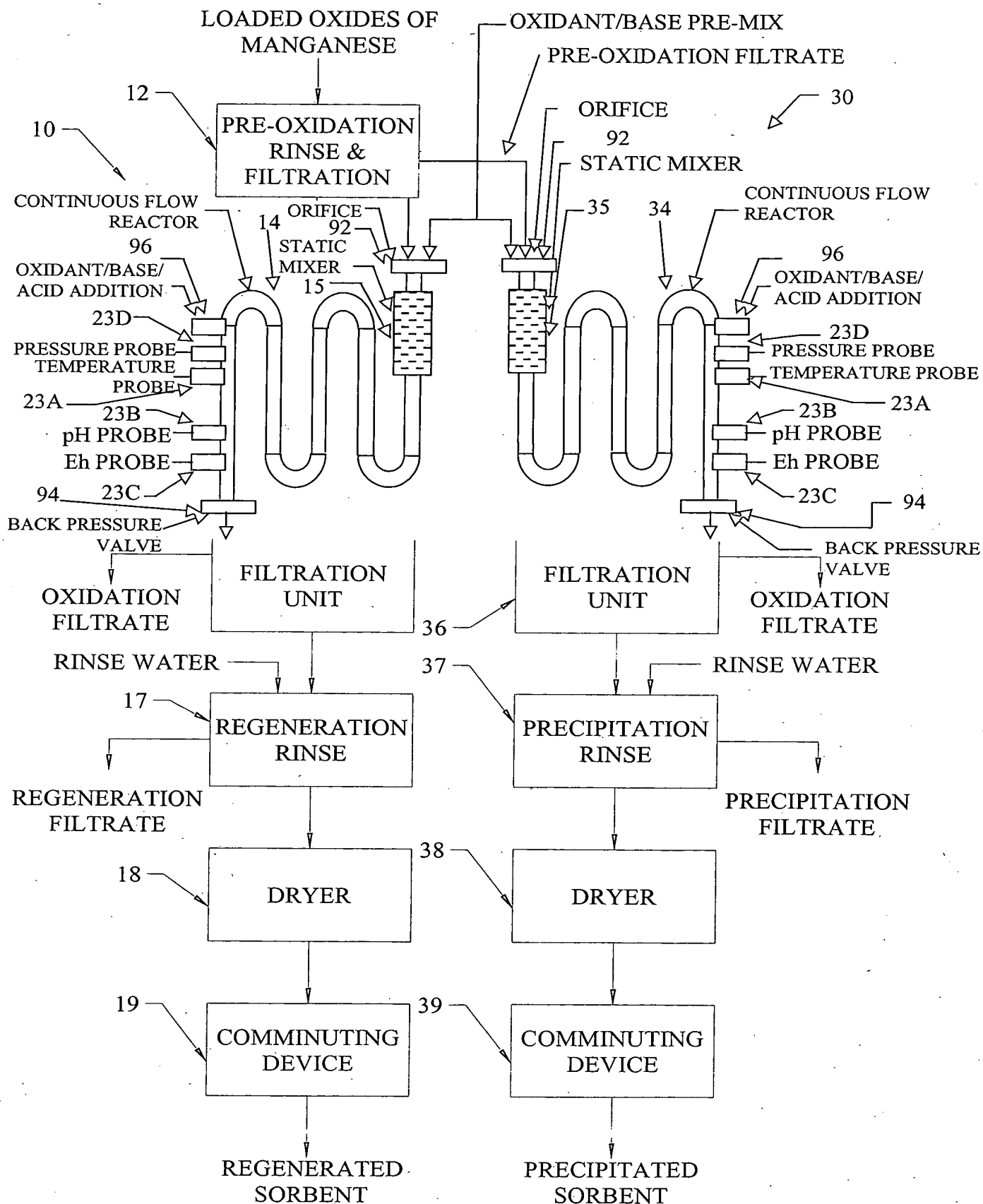


FIGURE 6  
PRE-TREATMENT OF VIRGIN SORBENT

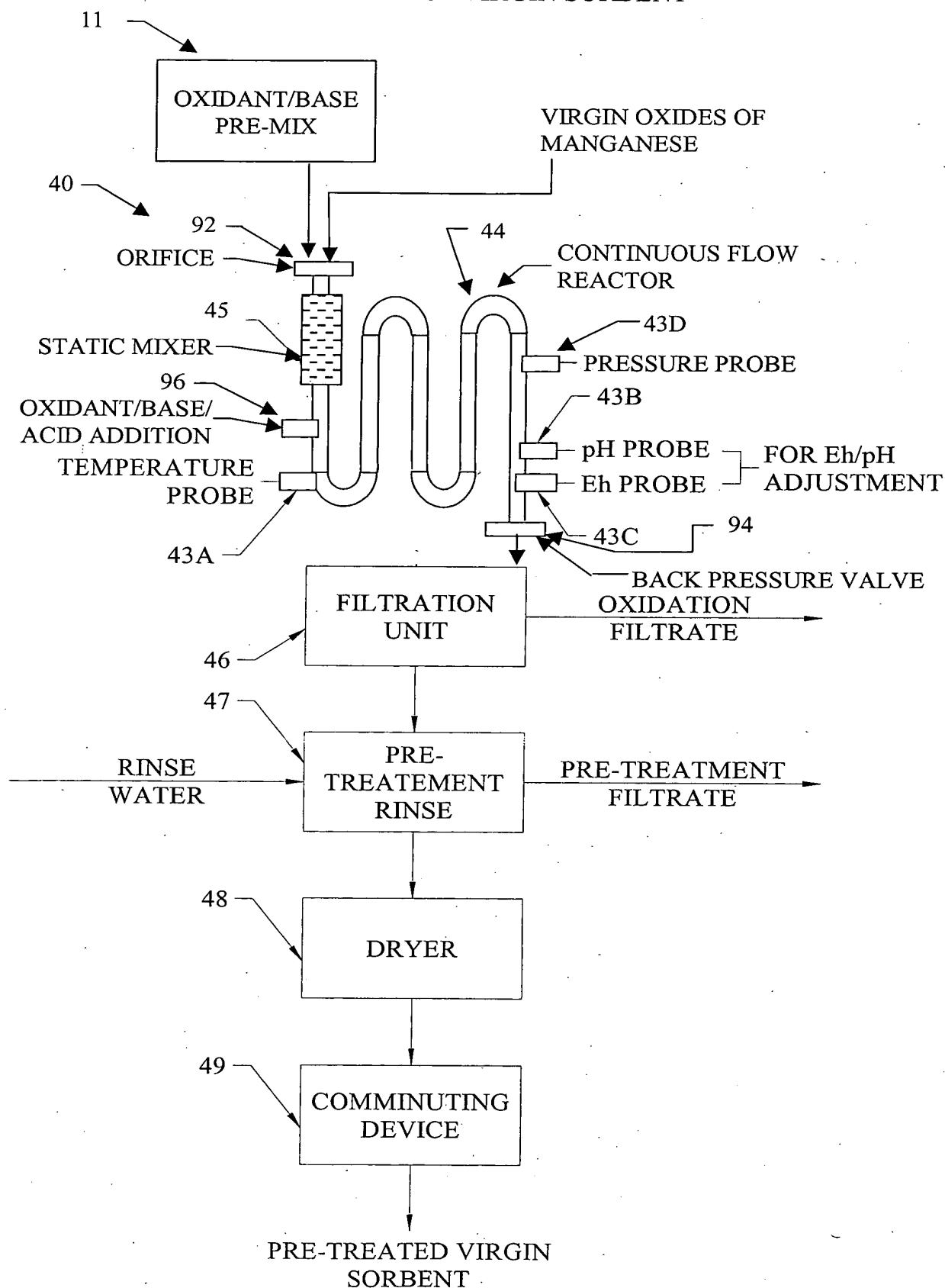


FIGURE 7  
PRECIPITATION OF VIRGIN OXIDES OF MANGANESE SORBENT

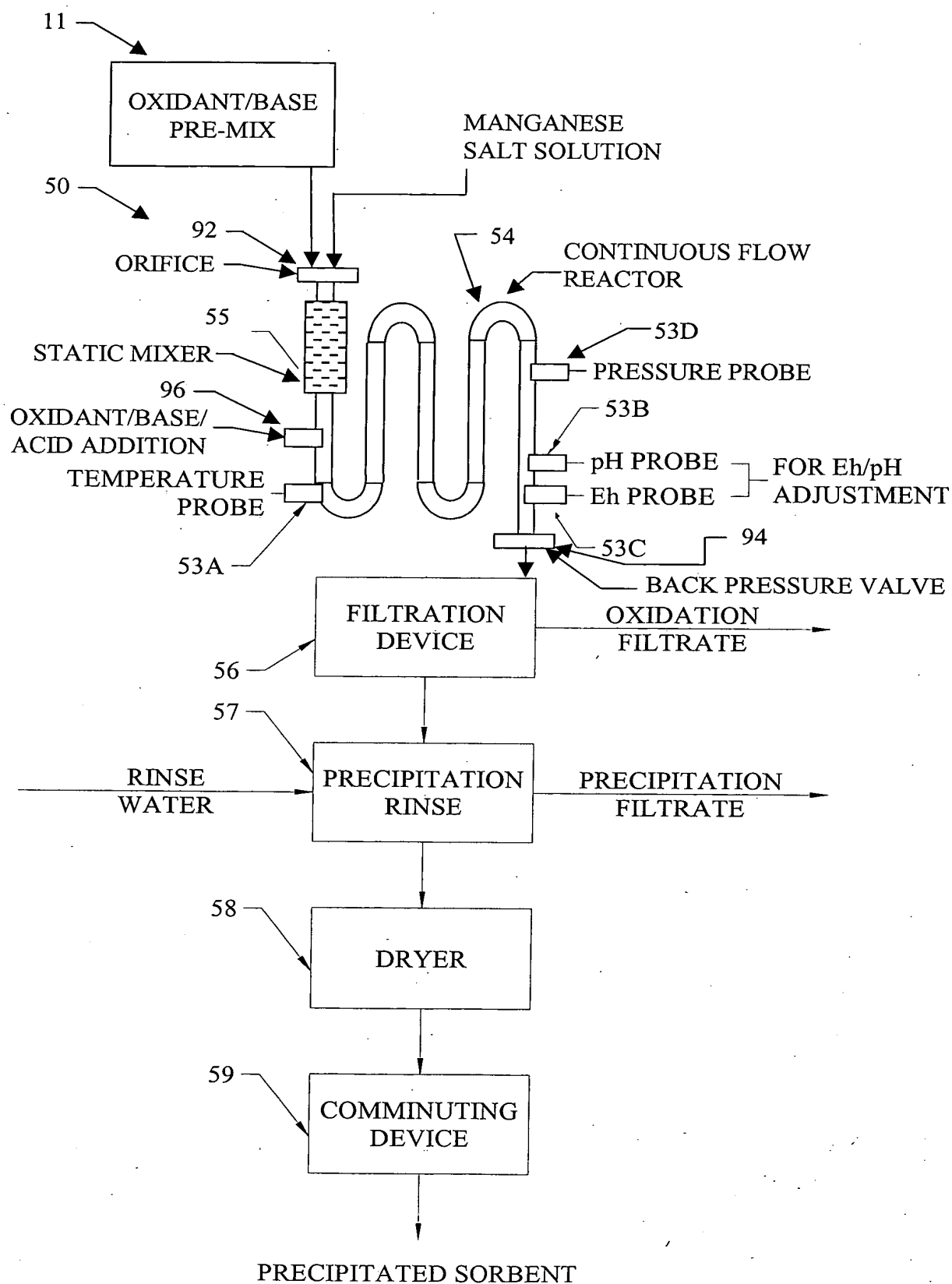
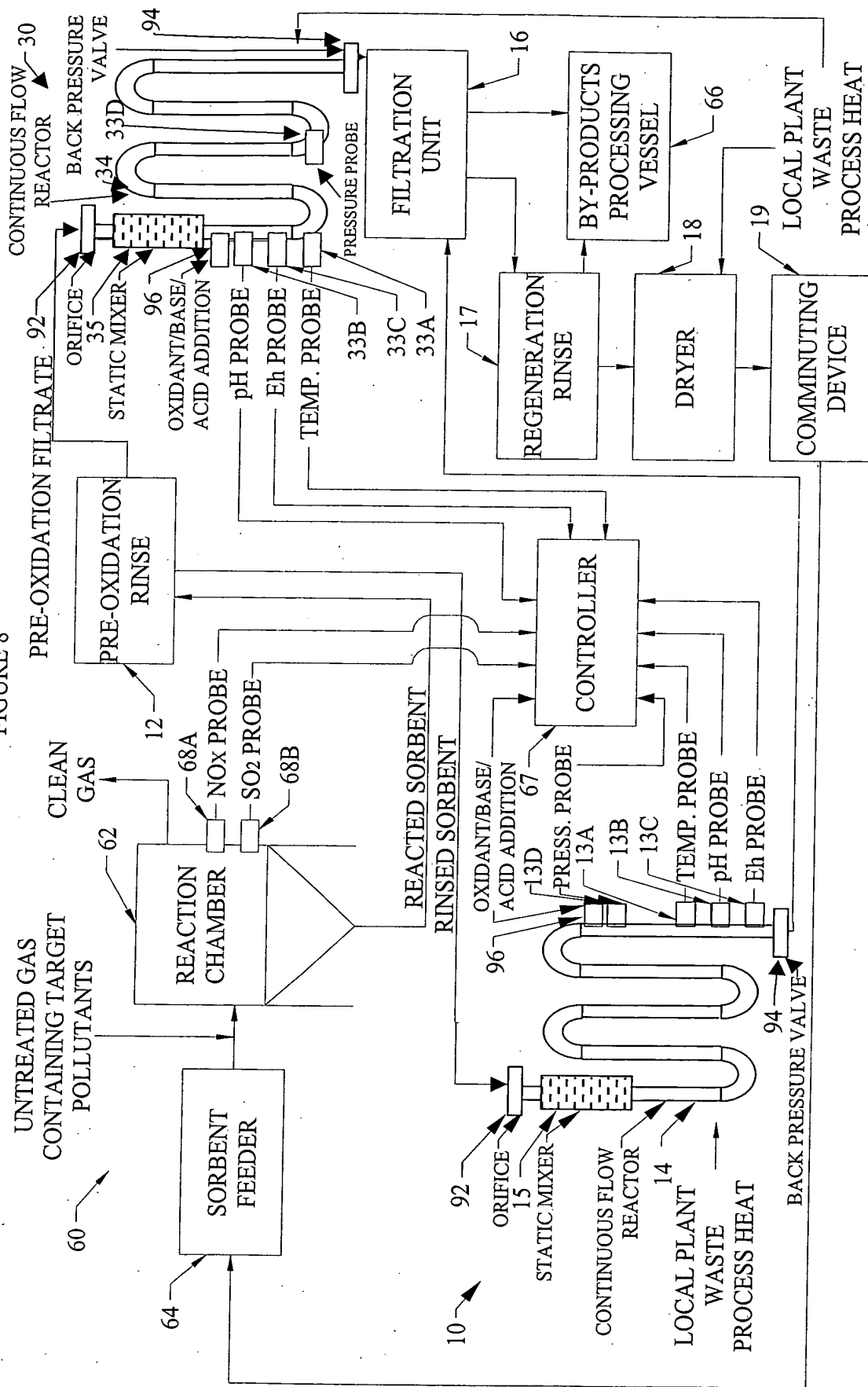
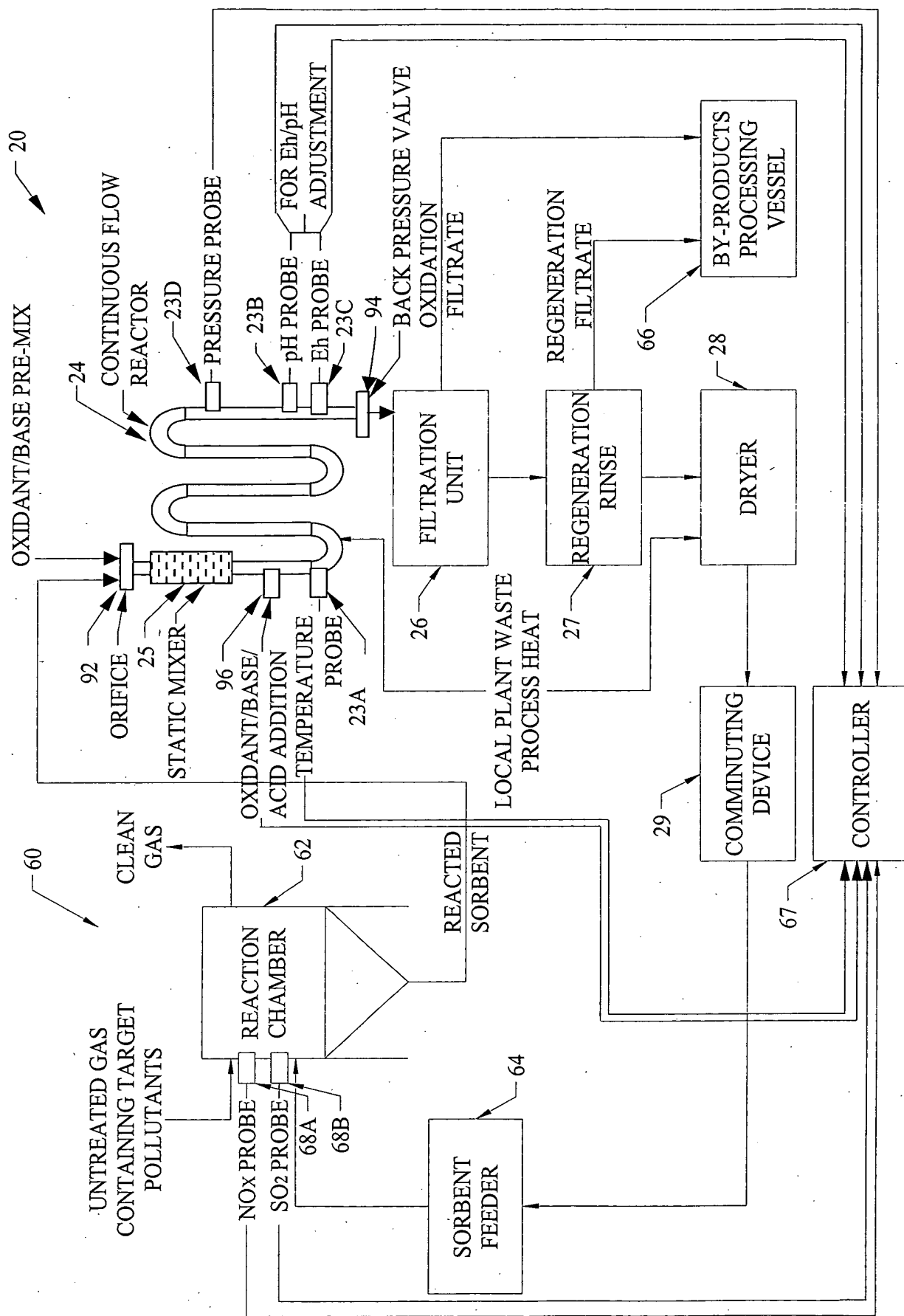


FIGURE 8





The diagram illustrates a gas treatment system 20. It features a sorbent feeder 64 that feeds a reaction chamber 62. The reaction chamber 62 is equipped with a NOx probe 68A and an SO2 probe 68B. The output of the reaction chamber 62 is a clean gas 60. The reaction chamber 62 is connected to a static mixer 25, which is also equipped with an orifice 92. The static mixer 25 is connected to a continuous flow reactor 24. The reactor 24 is equipped with a pressure probe 23D. The output of the reactor 24 is a filtrate 26, which is then processed by a filtration unit 26. The filtration unit 26 is connected to a regeneration rinse 27, which is also equipped with a back pressure valve 94. The regeneration rinse 27 is connected to a dryer 28, which is also equipped with a local plant waste process heat source 27. The output of the dryer 28 is a by-products processing vessel 66. The by-products processing vessel 66 is connected to a comminuting device 29, which is also equipped with a local plant waste process heat source 29. The comminuting device 29 is connected to a controller 67. The controller 67 is connected to the sorbent feeder 64, the reaction chamber 62, the static mixer 25, the reactor 24, the filtration unit 26, the regeneration rinse 27, the dryer 28, and the comminuting device 29. The controller 67 also receives data from the NOx probe 68A, the SO2 probe 68B, the pH probe 23B, the Eh probe 23C, and the pressure probe 23D. The controller 67 is also connected to a temperature probe 23A and a back pressure valve 94. The system also includes a temperature probe 23A and a back pressure valve 94.



The diagram illustrates a process for cleaning up pollutants from a gas stream using a sorbent. The process involves several interconnected components and steps:

- Gas Inlet:** "UNTREATED GAS CONTAINING TARGET POLLUTANTS" (60) enters the system.
- Reaction Chamber:** The gas enters a "REACTION CHAMBER" (17) where it meets a "SORBENT FEEDER" (62). The chamber is equipped with a "NOx PROBE" (68A) and an "SO<sub>2</sub> PROBE" (68B). "CLEAN GAS" (64) exits the top of the chamber.
- Sorbent Regeneration:** The spent sorbent is moved to a "REGENERATION RINSE & FILTRATION" unit (18). This unit is connected to a "COMMINUTING DEVICE" (19) and a "DRYER" (18). The "DRYER" is heated by "LOCAL PLANT WASTE PROCESS HEAT" (39). The regenerated sorbent is then fed back into the "SORBENT FEEDER" (62).
- Chemical Addition and Reaction:** A "BASE PRE-MIX" (11) is added to a "STATIC MIXER" (34) via an "ORIFICE" (92). "OXIDANT/BASE/REGENERATION FILTRATION" (96) is also added. The mixture then enters a "CONTINUOUS FLOW REACTOR" (35). The reactor is monitored by a "PRESSURE PROBE" (33D), "TEMPERATURE PROBE" (33A), "pH PROBE" (33B), and "Eh PROBE" (33C). A "BACK PRESSURE VALVE" (94) is located at the outlet of the reactor.
- Separation and Filtration:** The reaction mixture goes to a "FILTRATION UNIT" (36), which separates "OXIDATION FILTRATE" from the main stream. The main stream then enters a "PRECIPITATION RINSE" unit (37), which produces "RINSED SORBENT FILTRATE".
- Final Processing:** The "RINSED SORBENT FILTRATE" is sent to a "DRYER" (38), which is also heated by "LOCAL PLANT WASTE PROCESS HEAT" (39). The final "BY-PRODUCTS" (66) are then sent to a "PROCESSING VESSEL".
- Control System:** A "CONTROLLER" (67) receives signals from the various probes (33A, 33B, 33C, 33D, 68A, 68B) and manages the process.

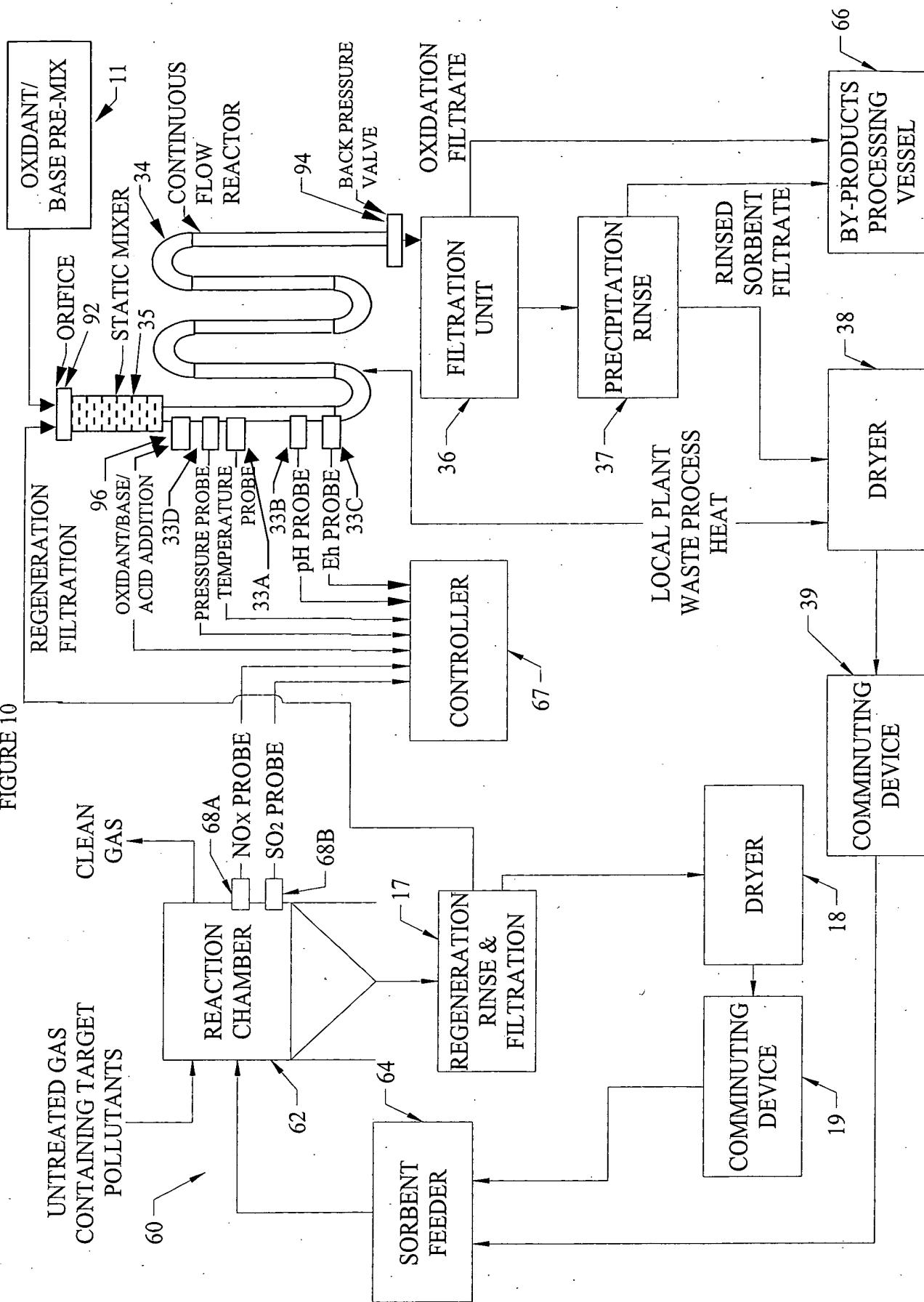


FIGURE 11  
ELECTROLYTIC CELL & BY-PRODUCTS

